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ABSTRACT

The tremendous potential of videodisc technology makes learning about this medium and its use a necessity for all educators. An overview describes video frames, videodisc formats, and visual display options. The three different levels of interactivity used to refer to the delivery of videodisc programs are outlined; they offer various amounts of control and require different hardware configurations. The instructional strategies employed in videodisc programs are: movies and documentaries, tutorials and instructional lessons, instructional games, visual databases, multimedia libraries, demonstrations, inquiry, simulations, and video report makers. Evaluation results from a study of 21 videodiscs for science and mathematics undertaken at the University of South Florida (Tampa) and the evaluation form are presented; highlights include instructional materials; frames, chapters and barcodes; content areas; and instructional strategies. Sample barcode activities are also provided. Appendices contain the names of the programs evaluated, videodisc resources, and the barcode activity answer key. (AEF)

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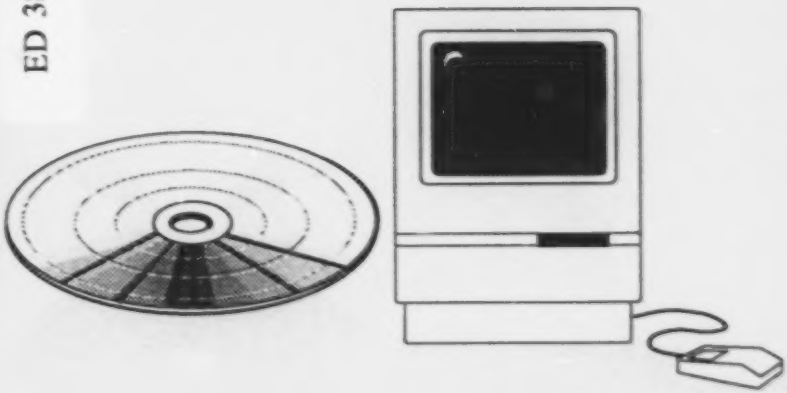

Videodiscs in Education

Overview, Evaluation, Activities

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Center for Excellence in Mathematics, Science, Computers, and Technology

Florida Center for Instructional Technology

Videodiscs in Education

Overview, Evaluation, Activities

Second Edition
February 1994

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Videodiscs in Education

The tremendous potential of videodisc technology makes learning about this medium and its use a necessity for all educators. In this publication, the authors provide an overview of videodisc technology, illustrate hardware configurations for videodisc delivery, provide an evaluation instrument for selecting appropriate videodiscs, publish the results of the assessments of several videodisc programs for science and mathematics, and highlight potential barcode activities. Videodisc resources and terminology are included in the Appendixes.

OVERVIEW

Videodiscs are either 8 or 12 inches in diameter. The material for a videodisc is initially recorded on a videotape. When the videotape is complete, it is sent to a mastering studio where the information is transferred onto a videodisc. After a videodisc is created, it cannot be changed.

Video Frames

Videotapes and videodiscs consist of a series of many frames or pictures. When the tape or disc is in the "play" mode, it moves at a rate of 30 frames per second to create the illusion of motion. The difference between the storage of the frames on a tape and a disc is illustrated in Figure 1.

On a videotape, the video frames are stored in a linear pattern. You must fast forward or rewind to locate the section you want. However, on a videodisc, the frames are stored in concentric circles that are read with a laser beam. Each circle represents a frame, and the laser beam can easily jump from one frame to another to provide almost instant access.

Figure 1. Videotape and Videodisc Frames

Another advantage of the disc storage format is that a single frame can be played over and over to produce a still frame. This is the same effect you get when you pause a videotape—but a videotape can become damaged if it is paused for more than a minute. In the case of a videodisc, however, there is absolutely no damage, and a picture can be on "still" for hours. This ability to still frame or freeze frame gives the user access to every single frame on the disc. With 30 minutes of motion on each side of the disc, and 30 frames per second, you can access any of the 54,000 still frames (30 frames per second x 60 seconds per minute x 30 minutes per side = 54,000 frames per side).

The access to the video frames is easy because every frame on a videodisc has a frame number. These numbers are automatically encoded on the disc when it is produced, and the numbers always range from 1 to 54,000 (if the entire disc is full). If you know the number of the frame you want to show, you can use the remote control unit or the computer to access it. Other features of a videodisc allow you to "step" (move forward or back by just one frame), "scan" (jump rapidly through the disc content), and "play" at various speeds, forward or reverse.

The audio on a videodisc is usually stored in two separate audio tracks that can be turned on or off independently. This feature provides possibilities such as having two different languages for the same video content or for having one track for the students and one for the instructor. The audio will be heard only if the videodisc is playing forward at the standard rate of 30 frames per second. If you are playing the disc faster, slower, or in reverse, there will be no sound.

Videodisc Formats

There are two different formats of videodiscs. The Constant Angular Velocity (CAV) format has a capacity for 30 minutes of motion video on each side (54,000 still frames), and it has the ability to still frame (stop on one frame). The CAV videodisc is the most popular format for education and training because of its versatility.

The other format is CLV, which stands for Constant Linear Velocity. A CLV disc is the same size as a CAV disc, but the video frames are stored in a different configuration—instead of having one frame on each concentric circle, a CLV disc may have several frames and parts of frames on the same circle. This is good and bad. It's good because more video can fit on a CLV disc—in fact, twice as much (60 minutes on each side). But it's bad because you lose many of the best features of videodiscs, such as the ability to still frame and step frame. Therefore, CLV discs are used primarily to play movies and programs that are designed to be linear, rather than interactive.

Instead of frame numbers, most CLV discs have time codes, which are listed in hours, minutes, and seconds. The time code starts at zero and is measured by the elapsed time from the beginning of the videodisc. It is important to note that although you can search for a particular time code on the disc,

you will NOT get a still picture. Instead, you can search and start to play from that particular location. Figure 2 summarizes some of the features of the CAV and CLV videodiscs. Note that both CAV and CLV discs allow chapter searches (jumping to a specific place on the disc, designated by a chapter number).

FEATURE	CAV	CLV
Minutes per Side	30	60
Normal Play	Yes	Yes
Still Frame	Yes	No
Step Frame	Yes	No
Multi Speed	Yes	No
Scan	Yes	Yes
Frame Search	Yes	No
Time Search	No	Yes
Chapter Search	Yes	Yes

Figure 2. Features of CAV and CLV Videodiscs

Monitors and TV Receivers

The videodisc player that most Florida schools have is a PIONEER LD-V2200. Similar players (PIONEER CLD-V2400, PIONEER CLD-V2600, Sony MDP-1150, and Panasonic LD30) are now available. The first step in using a player is to connect it to a video display unit. You can use a monitor (with a separate "video in" and "audio in"), or you can use a TV receiver (with a VHF input). To connect a monitor to the player, attach a video cable from the "video out" on the player to the "video in" on the monitor (see Figure 3). Then, connect audio cables from the "audio out" on the player (there are two) to the "audio in" on the monitor. If your monitor has only one "audio in," use a Y connector.

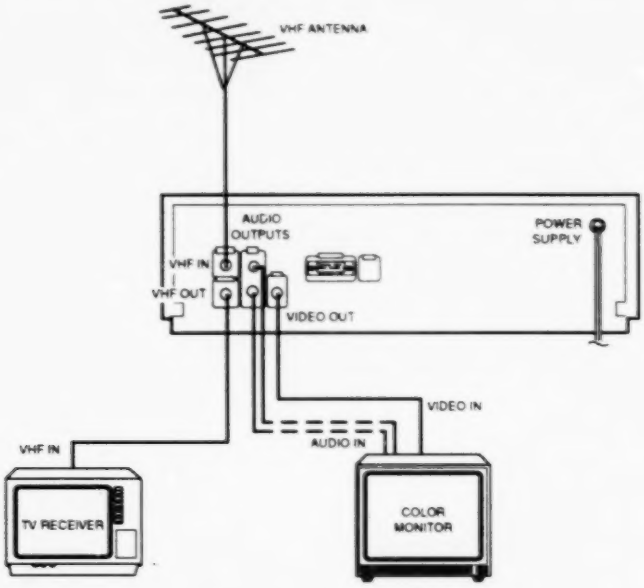


Figure 3. Visual Display Options

The alternative for video display is a TV receiver (Figure 3). In this case, connect the "VHF out" on the player to the "VHF in" on the receiver (an accessory RF cable is usually provided). Note that there may also be a VHF antenna input on the player. It would be used if you wanted your TV receiver to receive broadcast signals through the disc player.

After you have connected the player to a monitor or TV receiver, you are ready to load and play the videodisc. A videodisc is read with a laser beam **from the bottom** of the disc. Therefore, if it is a one-sided disc, it will be inserted with the shiny side down. If it is a two-sided disc, place the label up for the side you want to play. (Note: This is tricky; the label is on one side, but the player reads the opposite side.)

LEVELS OF INTERACTIVITY

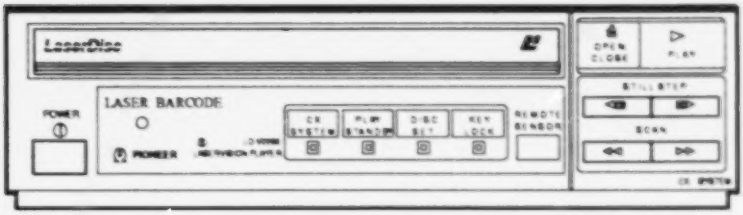
Three different levels of interactivity are commonly used to refer to the delivery of videodisc programs. These levels (I, II, and III) offer various amounts of control and require different hardware configurations. Most videodisc catalogs will list the level of the available videodiscs, along with the formats.

Level I

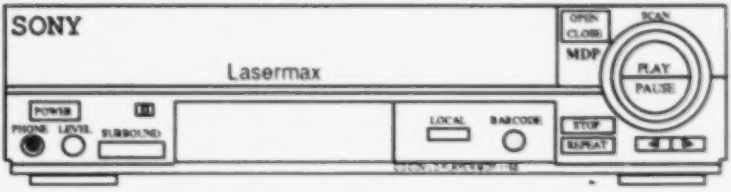
Level I interactivity refers to using the videodisc player without a computer connection. The disc is controlled through either the control panel on the front of the player, a remote control unit, or a barcode reader. An advantage of Level I delivery is that it allows you to exercise some control over the program without the expense and trouble of connecting a computer. Level I videodiscs can become Level III videodiscs if you connect a computer and purchase software to control the player. You can also "repurpose" a Level I videodisc by using HyperCard, LinkWay, or a similar program to create a computer control program.

Front Control Panel

One way to control a Level I disc is through the control panel on the front of the disc player. The front panel provides convenient access to videodisc controls. Just put in the disc and press "Play." If you want to stop the disc, press "Step" or "Stop." You can also "Scan" to jump forward to another section on the disc. Using the control panel is a lot like playing a videotape—you can start, stop, fast forward, and rewind, but you do not have the ability to access a specific frame number. Note in Figure 4 that different videodisc players offer slight variations in the controls available on the front panel.



Pioneer LD-V2200



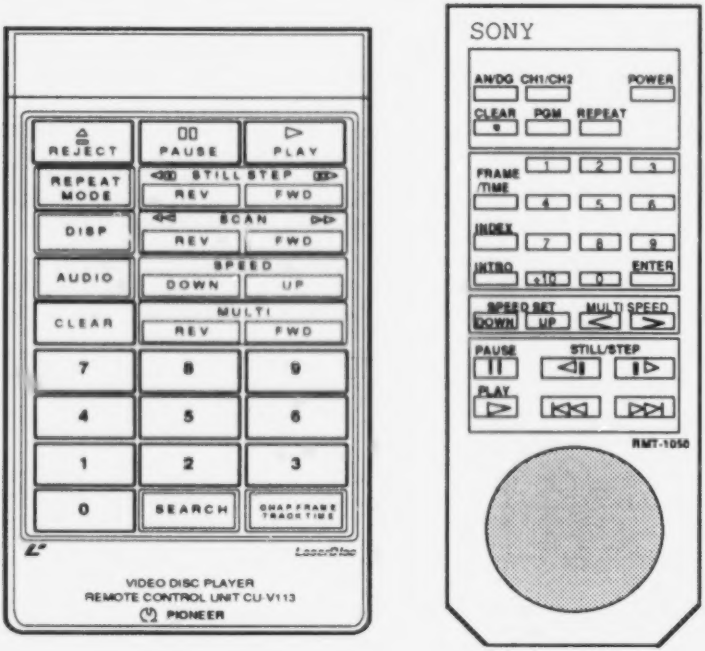
Sony MDP-1150

Figure 4. Front Panels of Videodisc Players

Remote Control Unit

Remote control units offer many options for Level 1 delivery. Again, remote units for different videodisc players will offer slightly different controls. Most of the controls are self-explanatory, so we will concentrate on only a few commands for the Pioneer and Sony players.

Display/Index: Two different numbers are embedded on CAV discs--frame numbers and chapter numbers. Pressing the DISP (Pioneer) or INDEX (Sony) button will display or remove the chapter numbers and the frame numbers on the screen (see Figure 5). On a CLV disc, time codes are displayed instead of frame numbers.



Pioneer Sony

Figure 5. Remote Control Units

Searching: The CHAPTER-FRAME/TIME button is used on the Pioneer to toggle back and forth between the chapter mode and the frame/time mode for searching purposes. In other words, if you had just searched for a Chapter and now wanted to search for a Frame, you would have to press this button once before pressing SEARCH to switch from the Chapter mode to the Frame/Time mode.

On the Sony remote, you are always in the Chapter mode. To do a Chapter search, just press the number; the number you input is directly sent to the player. (If the number is greater than 10, use the +10 key.) To do a Frame/Time search, press the FRAME/TIME button and the appropriate numbers. Then press ENTER.

Audio: On the Pioneer remote units, the AUDIO button is used to change between the two audio tracks. It is a 4-way switch—press it once and you have only TRACK 1; twice and you have TRACK 2; three times and you have NO AUDIO; and four times and you are back in the STEREO mode. Sometimes additional audio is stored on videodiscs in digital form (in addition to the two analog tracks). In this case, the AUDIO button will also cycle through the digital tracks.

On the Sony remotes, the Ch1/Ch2 button switches between Track 1 and Track 2 audio, and the ANALOG/DIGITAL button switches between the two sources.

Practice Searches:

#1: Assume you have a Pioneer player and a CAV disc. You are in the play mode of Chapter 2 and want to go to Frame 234.

1. Press STILL/STEP to stop the video.
2. Press CHP/FRAME/TIME to get in the FRAME mode.
3. Press 234.
4. Press SEARCH.
5. To start the video from here, press PLAY.

#2: Now, assume the same scenario if you have a Sony player.

1. Press STILL/STEP to stop the video.
2. Press the FRAME/TIME button.
3. Press 234.
4. Press ENTER.
5. To start the video from here, press PLAY.

Laser Barcode Reader

An alternative for Level 1 delivery is the laser barcode reader. This is a wand like the ones used in the grocery store that can read a series of black lines. Instead of pressing a button on the remote control, you scan a barcode on a piece of paper.

The barcode readers can be operated with direct cable connections or as remote controls. If you are operating in the remote mode, press READ as you scan the barcode, point it at the remote sensor, and press SEND. To operate with the cable, scan the barcode while pressing READ. (It will be sent automatically.)

Note that with the Pioneer players, the remote control unit will not work if the barcode reader is connected with the cable. Also, with the Sony player, you must press LOCAL on the front panel before using the barcode reader if a computer is connected to the player.

Figure 6 is an example of some of the barcodes that are being provided with videodiscs. Many of the commands are similar to those found on remote control units.

Figure 6. Sample Barcodes

Many videodisc programs are now providing barcode guides and lesson plans, instead of computer software. In some cases, the teachers' edition of textbooks may include barcode access to supplementary videodiscs.

There are computer software programs available that enable you to make and print your own barcodes. For example, you may want to access the video segment from Frame 2345 through Frame 2555. Through software programs such as *Bar'n'Coder* by Pioneer, or *Lesson Maker* by Optical Data, and a printer, you can print out a barcode that will have the command "Play 2345 - 2555" embedded in it. For examples of barcode activities, see pages 24-29 of this publication.

Level II

Level II interactivity refers to a videodisc that has a computer program embedded into the videodisc. The embedded program then controls the player without requiring an external computer. This provides even more flexibility than the Chapter and Frame searching of Level I interactivity. For example, multiple choice questions could be on a still frame, and if you answer "3" through the remote control, the videodisc would jump to a particular frame for feedback. This all sounds good, but the problem is that the program will only operate on particular videodisc players. Most of the videodisc players found in schools do not have the capability for Level II interactivity.

Level III

Level III interactivity is achieved when you connect the player to an external computer, and the computer controls the player. This allows more flexibility because a complex computer program can offer variety such as actions based on keyboard and other student inputs. In addition, databases can be stored on the computer, and the student can choose a term, picture, or image on the database that will automatically bring up the corresponding video on the video monitor. Level III programs also enable the computer to act as an instructional manager by storing student performance and records.

The configuration for Level III delivery is generally the same as for Level I with the addition of a computer and computer monitor (see Figure 7). Both monitors are necessary in most cases because the video monitor cannot display the computer information and the computer monitor cannot display the video information. Various input devices can be used with the computer. A printer is usually not needed unless the program offers the ability to take notes or print out a score.

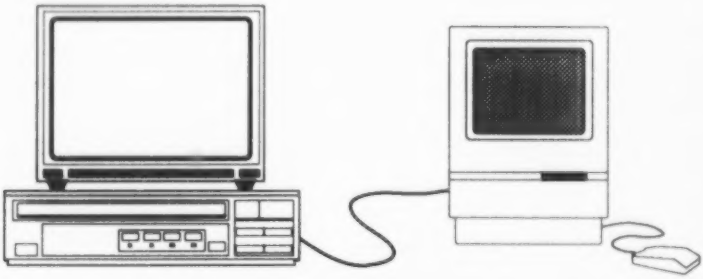


Figure 7. Configuration for Level III Interactivity

The computer for Level III delivery can be almost any type—Apple II, Macintosh, MS-DOS, or Amiga. In order for the computer to control the disc player, they must be hooked together through a serial interface cable (see Figure 8). These cables are usually available through the videodisc companies (see Appendix B).

Like other computer software, videodisc programs are not interchangeable between computers. If you are purchasing a Level III program, you must make sure that the software control program is compatible with your computer. Presently, the majority of Level III videodisc programs for education are developed for Macintosh computers. However, there are several excellent programs available for MS-DOS and Apple computers. Some programs are available for multiple platforms.

The settings for the baud rate are located on the back of most videodisc players (see Figure 8). The setting of the player must match the software program. Note that the Pioneer players are generally set to 4800 when they are purchased; Sony players are set to 1200. Check your videodisc manual for additional information about setting the baud rates.

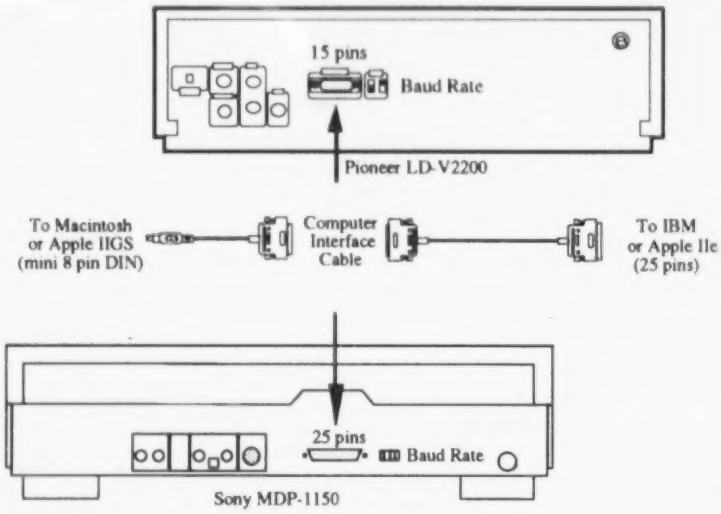


Figure 8. Cable Connections for Computer Interface

Apple II

To connect an Apple II to a videodisc player, your computer must have a serial port. You also need an RS-232 cable that has a serial connection at one end and a 15-pin (Pioneer) or 25-pin (Sony) connector on the other end (see Figure 8).

Macintosh and Apple II GS

Both the Macintosh and Apple II GS computers have a little round MODEM port on the back (the one with the telephone icon). To connect these computers to the disc player, you need a cable that will fit into this MODEM port at one end and the 15-pin or 25-pin connector at the other end. Many videodisc programs include a cable with the program.

MS-DOS

Most MS-DOS computers have a built-in serial port on the back (or you can add another serial port on an expansion card). After you have identified the port, it's a simple RS-232 connection over to the back of the videodisc player.

APPLICATIONS

There are many instructional strategies employed in videodisc programs, including linear movies, interactive tutorials, games, visual databases, and simulations. Some discs utilize only one strategy; other programs combine a variety of strategies.

Movies and Documentaries. Videodiscs offer a tremendous source of outstanding, yet inexpensive movies for schools. They can easily replace the 16mm film libraries at a fraction of the cost without worries about sprocket holes and rewinding. Even compared with videotape, discs have many advantages. For example, videodiscs don't wear out or degenerate with use. In addition, many educational films, commercial movies, and documentaries are available on videodisc at prices much cheaper than on videotape.

Tutorials and Instructional Lessons. Some videodisc programs are designed in the traditional tutorial strategy wherein new information is presented and then questions are presented to reinforce the instruction. With the ability to branch easily to any segment on the disc, the student is not locked into a particular sequence and can receive additional instruction based on his/her performance.

Instructional Games. Educational games usually offer a variety of special effects and motivate students with challenges of either beating the "clock," beating the computer, or solving a mystery.

Visual Databases. Many discs contain a series of still frames or pictures. They can be equated to a slide carousel with up to 54,000 slides (that will never be in upside-down or backward). The still frames can be accessed in a matter of seconds with a remote control unit, barcode reader, or computer.

Multimedia Libraries. The best way to describe a new breed of programs, such as *In the Holy Land* or *AIDS* by ABC News Interactive, is to call them multimedia libraries. These applications are not designed to teach—at least not in the customary fashion. Instead, they offer a wide array of interrelated information in videoclips, still frames, sound, text, and graphics.

Demonstrations. In this strategy, students view a demonstration of a physical phenomenon or scientific technique.

Inquiry. This strategy employs the techniques of making observations, asking questions, collecting data, grouping objects, making predictions, designing, experimenting, or discovering new concepts.

Simulations. Simulations recreate situations that may be too dangerous or expensive, or otherwise impossible for the student to experience in person. Students can explore various alternatives and make "life and death" decisions without harm to themselves or others.

Video Report Makers. A "video report" feature allows you to select and sequence the video material on the disc into a lesson or presentation. Although the video on the disc cannot be changed, you can "edit" a segment by changing the start and stop frames.

EVALUATION

The number of commercially available videodisc programs is increasing rapidly. Teachers wishing to use videodisc technology are faced with the problem of choosing videodiscs appropriate for their needs.

To provide assistance for teachers, a study was undertaken at the University of South Florida in Tampa. The purpose of the research was to evaluate commercial science videodiscs and to develop an instrument for their assessment. The evaluation form developed is included on pages 17 - 19 of this publication. It can be used as a guide for the selection of videodisc programs under consideration for your school or district.

Although the evaluation form was designed for science videodiscs, it can easily be modified and used for other content areas. Note that a major emphasis is the quantity and quality of instructor support materials, such as lesson plans and barcode indexes. These materials can greatly impact the *ease* of use and *amount* of use for a program.

Pages 20 - 23 contain the results of the evaluation of 21 videodiscs for science and mathematics. These matrixes are included to illustrate the features of popular videodisc programs that are on the market. (Additional information about these programs, such as price and publisher, is included on Appendix A, page 31.)

Please note that in some cases, additional materials may be purchased that complement the videodiscs. For example *Bio Sci Elementary* is an excellent supplement to the *Bio Sci II* videodisc and *Science Discovery Elementary* enhances the *Image and Activity Bank*.

VIDEODISC EVALUATION FORM

University of South Florida

GENERAL DESCRIPTION

TITLE OF VIDEODISC _____

SHORT TITLE (20 characters) _____

PUBLISHER _____

ADDRESS _____

_____

PHONE # _____ PRICE $ _____

LEVEL OF INTERACTIVITY: I III I & III

CONTENT AREA(S)

Earth Science	Life Science	Physical Science	General Science
Astronomy	Anatomy	Chemistry	Environmental Science
Geology	Botany	Physics	Meteorology
Zoology	Oceanography	Mathematics	

APPROPRIATE GRADE LEVEL:

K 1 2 3 4 5 6 7 8 9 10 11 12 Post-Secondary

FOR LEVEL III USE ONLY:

SOFTWARE COMPATIBILITY:
Macintosh MS-DOS Apple IIGS Apple IIe

MINIMUM RAM NEEDED _____ MB

MINIMUM HARD DISK SPACE NEEDED _____ MB

REPORT MAKER/LESSON MAKER Yes No

SPECIAL INFORMATION _____

DOCUMENTATION AND SUPPORT MATERIALS

INSTRUCTORS GUIDE	Yes	No
LESSON PLANS	Yes	No
STUDENT MANUAL	Yes	No
STUDENT WORKSHEETS	Yes	No
FOLLOW-UP ACTIVITIES	Yes	No
CORRELATED TO TEXTBOOKS	Yes	No

If yes, list the textbooks _____

NATURE OF VISUALS AND AUDIO

FORMAT			CAV	CLV
DISC CONTAINS CHAPTERS			Yes	No
QUALITY OF VISUALS	Poor	Good	Excellent	
ESTIMATE OF TOTAL NUMBER OF STILL PICTURES: _____				
ESTIMATE OF TOTAL TIME IN VIDEO SEGMENTS: _____				
AUDIO-TRACK 1:	Nothing	English	Spanish	Other
AUDIO-TRACK 2:	Nothing	English	Spanish	Other

INDEXING (PRINTED PAPER)

STILL FRAMES INDEXED	Yes	No
BY NUMBER	Yes	No
BY CONTENT	Yes	No

BARCODING

BARCODES	Yes	No
FOR MOST STILL FRAMES	Yes	No
FOR CHAPTERS	Yes	No
BARCODES INDEXED	Yes	No
BARCODES FOR LESSONS	Yes	No
SOFTWARE FOR CREATING BARCODES	Yes	No

INSTRUCTIONAL STRATEGIES EMPLOYED

TUTORIAL	Yes	No	Major Emphasis
DRILL AND PRACTICE	Yes	No	Major Emphasis
INSTRUCTIONAL GAME	Yes	No	Major Emphasis
DOCUMENTARY OR MOVIE	Yes	No	Major Emphasis
VISUAL DATABASE	Yes	No	Major Emphasis
MULTIMEDIA LIBRARY	Yes	No	Major Emphasis
DEMONSTRATION (Students view a demonstration of a physical phenomenon or scientific technique.)	Yes	No	Major Emphasis
INQUIRY Making observations, asking questions, collecting data, grouping objects, making predictions, designing, experimenting, discovering new concepts.	Yes	No	Major Emphasis
SIMULATION			
(1) Students ACTIVELY INVESTIGATE a scientific phenomenon (e.g., propel a projectile at various angles or speeds and note trajectories and ranges.)	Yes	No	Major Emphasis
(2) Students ROLE PLAY in a situation to explore the effects of different approaches. Upon an input, the situation may be improved or worsened. The new situation will then determine the next input.	Yes	No	Major Emphasis
(3) Students LEARN or PRACTICE a PROCEDURE by making inputs to the simulation as it runs (e.g., flying an airplane, diagnosing a medical problem, troubleshooting an electrical circuit).	Yes	No	Major Emphasis

SPECIAL OBSERVATIONS

Instructional Materials

The matrix in Figure 9 focuses on the documentation and support materials provided with the videodiscs. These materials include instructor's guides, lesson plans, student manuals, student activities, and follow-up activities.

TITLE	Instructors Guide	Lesson Plans	Student Manual	Student Activities	Follow Up Activities
AIDS	•	•			•
BioSci II	•	•		•	•
Chemistry at Work	•	•		•	•
Cosmic Chemistry	•	•		•	•
Discover the Wonder: Grade 3	•	•		•	•
Great Ocean Rescue	•	•	•	•	•
Great Solar System Rescue	•	•	•	•	•
Human Body	•	•		•	•
Hurricane Hugo	•	•			•
Image and Activity Bank	•	•		•	•
Insects: A Closer Look	•	•		•	•
Jasper Woodbury: Vol. 1 and 2	•	•		•	•
Math for Beginners: Vol. 1	•				
Modumath: Algebra	•	•	•	•	
Our Environment	•	•	•	•	•
Physics of Sports	•	•	•	•	•
Planet Earth: Force Within	•	•		•	
Race to Save the Planet	•	•		•	•
Science Sleuths	•	•		•	•
Windows on Science: Primary	•	•		•	•
A World Alive					

Figure 9. Instructional Materials

Frames, Chapters, and Barcodes

In order to provide access to the frames and chapters of a videodisc through a remote control unit or a barcode reader, frame numbers, chapter numbers, or barcodes are necessary. Printed indexes of this information are very useful. Figure 10 indicates the degree to which the various videodiscs provide information on frames, chapters, and barcodes.

TITLE	Frames Indexed	Chapters on Disc	Barcodes	Barcodes Indexed	Barcode Software
AIDS	•	•	•		
BioSci II	•	•	•	•	•
Chemistry at Work	•	•	•	•	•
Cosmic Chemistry	•	•	•		•
Discover the Wonder: Grade 3	•	•	•		
Great Ocean Rescue	•	•	•	•	
Great Solar System Rescue	•	•	•	•	
Human Body	•	•	•		
Hurricane Hugo	•				
Image and Activity Bank	•	•	•	•	
Insects: A Closer Look	•	•	•	•	
Jasper Woodbury: Vol. 1 and 2		•	•		
Math for Beginners: Vol. 1		•	•		
Modumath: Algebra			•		
Our Environment		•	•		
Physics of Sports	•	•	•	•	
Planet Earth: Force Within	•	•	•	•	
Race to Save the Planet					
Science Sleuths		•	•		
Windows on Science: Primary	•		•	•	
A World Alive		•			

Figure 10. Frames, Chapters, and Barcodes

Content Areas

Figure 11 indicates the content areas addressed by each of the videodiscs that were evaluated. The recommended grade levels are also noted on this matrix.

TITLE	Gen. Sci	Phys. Sci.	Earth Sci.	Bio. Sci.	Math	Grade Levels
AIDS				•		7-12
BioSci II	•			•		7-college
Chemistry at Work		•				10-college
Cosmic Chemistry		•	•			7-12
Discover the Wonder: Grade 3	•					3
Great Ocean Rescue	•		•	•		5-8
Great Solar System Rescue	•		•			5-8
Human Body	•			•		6-12
Hurricane Hugo	•		•			6-9
Image and Activity Bank	•	•	•	•		6-8
Insects: A Closer Look	•			•		4-7
Jasper Woodbury: Vol. 1 and 2					•	5-8
Math for Beginners: Vol. 1					•	1-4
Modumath: Algebra					•	7-10
Our Environment	•			•		K-8
Physics of Sports		•				8-12
Planet Earth: Force Within	•	•	•			7-college
Race to Save the Planet	•		•	•		5-12
Science Sleuths	•	•	•	•		6-9
Windows on Science: Primary	•					1-3
A World Alive	•			•		2-college

Figure 11. Content Areas and Grade Level

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Instructional Strategies: Major Emphasis

There are many different instructional strategies that may be employed in interactive videodisc programs (see pages 14-15.) The matrix in Figure 12 indicates the instructional strategies employed by the videodiscs. A small dot indicates that the strategy is used; a large dot indicates the strategy is a major emphasis of the videodisc.

TITLE	Tutorial	Game	Movie	Visual Database	Multimedia Library	Demonstration	Inquiry	Simulation
AIDS	•			•	●	•	•	
BioSci II	•			●		•		
Chemistry at Work	•			●		•		
Cosmic Chemistry	●			●		•	•	
Discover the Wonder: Grade 3	●			•		•	•	
Great Ocean Rescue		●		•			●	●
Great Solar System Rescue		●		•			●	●
Human Body	●			●		•	•	
Hurricane Hugo	•	•			●	•		
Image and Activity Bank	•			●		•	•	
Insects: A Closer Look	●		•				•	
Jasper Woodbury: Vol.1 and 2							●	•
Math for Beginners: Vol. 1	●							
Modumath: Algebra	●							
Our Environment	●			●				
Physics of Sports	●			•		●	●	
Planet Earth: Force Within	•		•	•				
Race to Save the Planet	•	•			●			•
Science Sleuths		●					●	●
Windows on Science: Primary	●			●		•	•	
A World Alive			●		•			

Figure 12. Instructional Strategies

BARCODE ACTIVITIES

There are many ways that barcodes can be used to integrate videodisc technology into your curriculum. In addition to purchasing programs that provide barcode access, indexes, and activities, you can create your own barcodes with barcode generation software (see Appendix B for a list of barcode software).

Barcodes are generic. It does not matter which software program or computer you use to create them, because all barcodes will work with all videodisc players. You can print the barcodes with dot matrix or laser printers, and you can duplicate them with a copy machine. For more durability, you can even laminate the barcode activities.

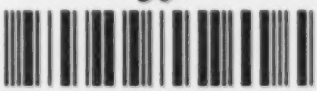
When you create your own barcodes, you can electronically "paste" them into a word processor, or you can print them on labels and stick the labels on paper and other objects. For example, barcodes can be placed on a map, a skeleton, or a globe to provide access to pertinent information on a videodisc.

Barcodes are easy to create and barcode activities are easy to deliver. You do not need a computer in the classroom, and the barcodes automatically start and stop the videodisc at the appropriate places.

The potential for barcode activities in the curriculum is limited only by your imagination. You can paste them into lesson plans, or you can create worksheets for learning centers or large group activities. Students also enjoy creating barcodes and can incorporate them into multimedia research reports or other activities. This section provides suggestions for barcode activities through examples using the *Florida Science Videodisc III* (see Answer Key on page 34). Frame numbers are included for future reference.

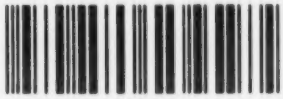
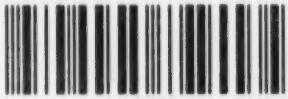
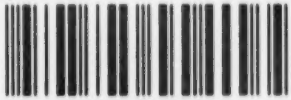
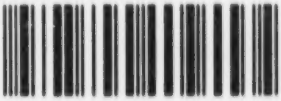
JEOPARDY!

Students are placed into groups and one group selects a category and point value. The teacher scans the barcode and an animal appears. Groups raise their hands and try to identify the picture. Students must identify the animal with a question-like statement, such as "What is an elephant?" The group with the correct answer controls the board and selects the point value of the next category.

BIRDS	MAMMALS
10 9135	10 9240
20 12909	20 8655
30 12921	30 11469
40 12891	40 8673
50 8574	50  8106

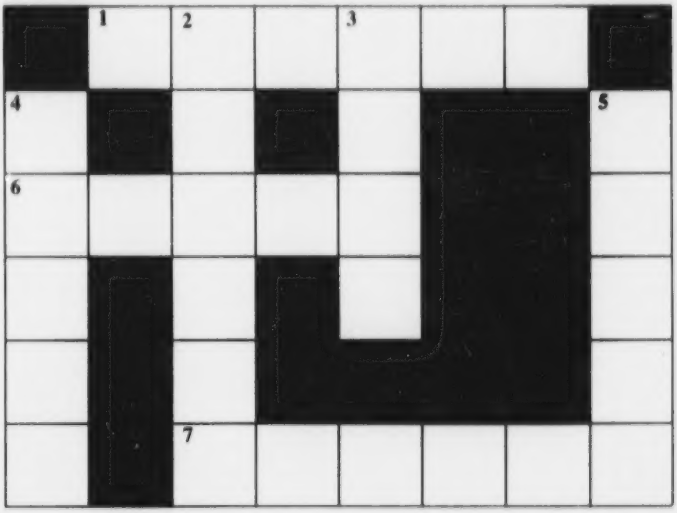
CONCENTRATION: Creatures in Habitat

Students are placed into groups. Each group in turn tries to find a match between an animal and its habitat. Each successful match is worth one point and the group receives another try. Successful matches are eliminated by crossing out the barcode.

1  7188	2  4320
3 10140	4  10182
5  10215	6 11694
7 11472	8 9606
9 10696	10 5814

ANIMAL CROSSWORD

Use the barcode hints below to identify Florida animals and fill in the Crossword Puzzle.



1 Across
6591

2 Down
12921

6 Across
9240

3 Down
14514

7 Across
12490

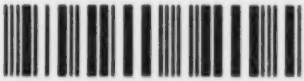
4 Down
12748

5 Down
16426-16446

FORMS OF ENERGY

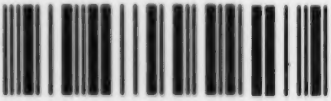
Energy exists in many forms. Major forms of energy include: mechanical energy, heat energy, electrical energy, radiant energy, chemical energy, and nuclear energy.

Indicate which form of energy is illustrated in each of the frames listed below. In addition, list whether the frame shows kinetic energy or potential energy.

FRAME	FORM OF ENERGY	KINETIC or POTENTIAL?
819		
624		
837		
 2337		
597		
612		

LIFE CYCLE

The barcodes below display different stages in the life cycle of a lima bean plant. Place a number in the space next to each barcode to order the stages by time.

BARCODE	SEQUENCE
7972	
9528	
7944	
 7959	
7950	

CONCLUSION

Videodisc technology offers great potential to add new dimensions to classrooms and media centers. A single videodisc can incorporate many forms of instructional media—text, charts, graphs, audio, and video motion—into a single medium. In addition, the videodisc player provides easy access to the information stored on the disc. The user can randomly search for any frame or chapter, can vary the direction of play (forward or reverse), and can vary the speed (normal, fast, slow, or still frame).

When the capacities of a videodisc and player are combined with the power of a computer or barcode reader, the system becomes a tool for delivering individualized interactive instruction, illustrating lecture material, or providing group-based inquiry. The integration of this technology can promote problem-solving abilities and engage students in the construction of their own knowledge.

Videodisc Programs

The videodisc programs in Appendix A are referenced in this publication. This list is included to illustrate a variety of applications; it is not meant to imply program quality or specific recommendations.

Several videodisc resources are provided in Appendix B. The information is based on current catalog prices, and every attempt has been made to provide correct and accurate information. However, the authors make no warranty or representation, either expressed or implied, that the information provided in the listing is complete or accurate. Interested parties should contact the companies directly for ordering information and prices.

APPENDIX A

VIDEODISC PROGRAMS

The following videodisc programs were evaluated using the assessment criteria on pages 17 - 19. See Appendix B for contact information.

Program	Level	No. Sides	Company	Software	Spanish?	Price
AIDS	I, III	2	Optical Data	Mac, DOS	Y	$ 495
BioSci II Videodisc	I	1	Videodiscovery		Y	$ 549
BioSci Software	III		Videodiscovery	Mac, DOS		$ 150
Chemistry at Work	I	2	Videodiscovery		Y	$ 549
Chemistry Software	III		Videodiscovery	Mac, DOS		$ 150
Cosmic Chemistry	III	8	Optical Data	Mac	Y	$1295
Discover the Wonder: Grade 3	I	1	Scott Foresman		Y	$ 129
Great Ocean Rescue	I, III	2	Tom Snyder	Mac, Windows	N	$ 400
Great Solar System Rescue	I, III	2	Tom Snyder	Mac, Windows	N	$ 350
Human Body	I, III	5	Optical Data	Mac, DOS	Y	$ 995
Hurricane Hugo	III	1	Turner Educational	DOS	N	$ 80
Image & Activity Bank	I	2	Videodiscovery		Y	$ 350
Insects: A Closer Look	I	2	Pegasus		N	$ 138
Jasper Woodbury: Vol. 1 and 2	I, III	2	Optical Data	Mac	N	$ 695
Math for Beginners: Volume 1	I	1	Coronet/MTI		N	$ 215
Modumath Algebra	I	2	Coronet/MTI		N	$ 395
Modumath Software	III		Coronet/MTI	DOS		$ 75
Our Environment	I	1	Pegasus		N	$ 455
Physics of Sports	I	1	Videodiscovery		N	$ 275
Physics Software	III		Videodiscovery	Mac		$ 125
Planet Earth: Force Within	I, III	2	Coronet/MTI	Mac, DOS	Y	$ 325
Race to Save the Planet	III	2	Scholastic	Mac	Y	$ 395
Science Sleuths	I	2	Videodiscovery		Y	$ 350
Windows on Science: Primary	I	6	Optical Data		Y	$1485
A World Alive	I, III	2	Voyager	Mac	N	$ 50

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APPENDIX B
VIDEODISC RESOURCES

BFA Educational Media
2349 Chaffee Dr.
St. Louis, MO 63146
800-221-1274

Churchill Media
12210 Nebraska Ave.
Los Angeles, CA 90025
800-334-7830

Coronet/MTI Film & Video
108 Wilmot road
Deerfield, IL 60015
800-621-2131

Creative Laser Concepts
555 Saturn Blvd., Ste. B-281
San Diego, CA 92154
619-424-5117

Crest Visual
P.O. Box 210605
Montgomery, AL 36121
800-348-6890

Davidson & Associates, Inc.
19840 Pioneer Ave.
Torrance, CA 90503
800-545-7677

Discovery Channel
7700 Wisconsin Ave.
Bethesda, MD 20814
301-986-1999

Emerging Technology Consultants
2819 Hamlin Ave. North
St. Paul, MN 55113
612-639-3973

Encyclopedia Britannica Corp.
310 South Michigan Avenue
Chicago, IL 60604
800-554-9862

Fred Lasswell Inc.
1111 N. Westshore Boulevard
Tampa, FL 33607
813-289-4486

Houghton Mifflin
222 Berkeley St.
Boston, MA 02116
617-351-5000

Imedia International
578 Broadway 5th Floor
New York, NY 10012
212-431-9200

Instructional Resources Corp.
1819 Bay Ridge Ave., Suite 600
Annapolis, MD 21403
800-922-1711

Laser Disc Corporation of America
3-A Oak Road
Fairfield, NJ 07004
800-USA-DISC

Laserdisc Fan Club
P. O. Box 93103
Long Beach, CA 90810
800-322-2285

Laser Learning Technologies
3114 37th Place South
Seattle, WA 98144
800-722-3505

Lucerne Media
37 Ground Pine Road
Morris Plains, NJ 07950
800-341-2293

Minnesota Educational Computing Corp.
6160 Summit Dr. North
Minneapolis, MN 55430
800-685-MECC

Modern Talking Picture Service, Inc.
515 Madison Avenue, Suite 500
New York, NY 10022
800-237-7114

National Geographic Society
P. O. Box 98019
Washington, DC 20090
800-368-2728

APPENDIX B

VIDEODISC RESOURCES

Optical Data Corporation
30 Technology Drive
Warren, NJ 07059
800-524-2481

Optical Programming Associates
455 Park Avenue
New York, NY 10022
800-451-1833

Optilearn
P.O. Box 997
Stevens Point, WI 54481
715-344-6060

Pegasus Learning Company
16 N. Chestnut Street
Colorado Springs, CO 80905
719-634-4969

Pioneer Communications of America
2265 E. 220th Street
Long Beach, CA 90810
310-952-2111

Public Media Video
P. O. Box 800
Concord, MA 01742
800-262-8600

Scholastic Software
P.O. Box 7502
Jefferson City, MO 65102
800-541-5513

Scott Foresman and Co.
1900 East Lake Ave.
Glenview, IL 60025
800-882-3030

Silver Burdett & Ginn
P.O. Box 2649
Columbus, OH 43216
800-848-9500

Sunburst Communications
39 Washington Ave.
Pleasantville, NY 10570
800-431-1934

Society for Visual Education Inc.
Department BM, 1345 Diversey Pkwy.
Chicago, IL 60614-1299
312-525-1500

Teaching Technologies
P. O. Box 3808
San Luis Obispo, CA 93403-3808
805-541-3100

Tom Snyder Productions
80 Coolidge Hill Rd.
Watertown, MA 02172
800-342-0236

Turner Educational Services
105 Terry Dr. Suite 120
Newtown, MA 18940
800-344-6219

TV Ontario
1140 Kildaire Farm Rd., Suite 308
Cary, NC 27511
800-331-9566

U. S. Video Source
3-A Oak Road
Fairfield, NJ 07004
800-USA-DISC

Videodiscovery
1700 Westlake Ave. North Suite 600
Seattle, WA 98109-3012
800-548-3472

Voyager Company
1 Bridge St.
Irvington, NY 10533
800-446-2001

Warner Home Video
P. O. Box 1968
Burbank, CA 91522
818-955-9999

Ztek Company
P.O. Box 1055
Louisville, KY 40201
800-247-1603

APPENDIX B
BARCODE SOFTWARE

Bar Magic
The Better Barcode Co.
9241 Deep Water Point Rd.
St. Michaels, MD 21663
410-745-2280

BarCode Maker
Creative Laser Concepts
4449 Vista Nacion Dr.
Chula Vista, CA 91910
619-420-1945

Bar 'n' Coder, BarKoder
Pioneer Communications
2265 E. 220th St.
Long Beach, CA 90810
310-952-2111

Lesson Maker
Optical Data Corporation
30 Technology Drive
Warren, NJ 07059
800- 524-2481

MediaMAX
1700 Westlake Ave. N.
Seattle, WA 98109-3012
800-548-3472

VIDEODISC MANUFACTURERS

Panasonic Corp. of America
50 Meadowland Parkway
Secaucus, NJ 07094
800- 524-0864

Sony Electronics, Inc.
3 Paragon Drive
Montvale, NJ 07645
201- 930-6138

Pioneer Communications
2265 E. 220th St.
Long Beach, CA 90810
310-952-2111

APPENDIX C - BARCODE ANSWER KEY

JEOPARDY!

BIRDS	MAMMALS
10 duck	10 horse
20 geese	20 deer
30 parrots	30 camel
40 blue heron	40 Fl. panther
50 anhinga	50 killer whale

CROSSWORD PUZZLE

ACROSS	DOWN
1 - spider	2 - parrot
6 - horse	3 - deer
7 - turtle	4 - sheep
	5 - snake

CONCENTRATION

1 pairs with 5
2 pairs with 7
3 pairs with 8
4 pairs with 10
6 pairs with 9

LIFE CYCLE

4 5 1 3 2

FORMS OF ENERGY

1	Hydroelectric	Potential
2	Heat energy	Potential
3	Heat energy	Kinetic
4	Heat energy	Kinetic
5	Nuclear energy	Kinetic
6	Radiant energy	Kinetic
7	Electrical energy	Kinetic

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The **Florida Center for Instructional Technology** (FCIT) in the College of Education at the University of South Florida, is one of four state funded technology Centers located throughout Florida. FCIT provides leadership and support services to educational institutions with regard to the integration of technology in education. Since 1982, FCIT has secured funding from grants, contracts, and other sources to develop and conduct software evaluation activities, develop telecommunications training materials and activities, create and produce various software resource programs, create and support online database resources, perform staff development, and many other activities.

In addition, knowledge acquired by FCIT staff members has impacted many different undergraduate and graduate programs in the College and has helped to shape the substance of instructional technology on the college, university, state, and national scales. Requests for additional information are welcome. Please write to the following address: Florida Center for Instructional Technology, 4202 E. Fowler Avenue, EDU 208B, University of South Florida, Tampa, FL 33620-5300.